

WHAT IS CLAIMED IS:

1. A sensor element comprising negative and positive electrodes disposed on the same side of a solid electrolyte substrate, wherein

the area of said negative electrode differs from the area of said positive electrode.

2. The sensor element according to Claim 1, wherein the area of said negative electrode and the area of said positive electrode differ by at least twofold.

3. The sensor element according to Claim 1, wherein the ratio of the area of said negative electrode to the area of said positive electrode is in the range of from 2:1 to 5:1.

4. The sensor element according to Claim 1, wherein the ratio of the area of said negative electrode to the area of said positive electrode is in the range of from 1:2 to 1:5.

5. The sensor element according to Claim 1, further comprising a circuit for applying an electric potential between said negative electrode and said positive electrode so as to determine a gas concentration.

6. The sensor element according to Claim 5, wherein said electric potential is in the range of 0.2 V to 1.1 V.

7. The sensor element according to Claim 5, wherein said electric potential is in the range of 1.1 V to 2.5 V.

8. The sensor element according to Claim 1, wherein said solid electrolyte substrate is formed from zirconia.

9. The sensor element according to Claim 1, wherein at least one of said negative electrode and said positive electrode is embedded in said solid electrolyte substrate.

10. The sensor element according to Claim 1, wherein said negative electrode and said positive electrode are formed from porous platinum.

11. A flat current-limiting sensor comprising a sensor element according to Claim 1.

12. A sensor for determining the concentration of an oxygen-containing component of a gas to be measured, comprising:

a ceramic body capable of electrically controlling the rate of oxygen ion conduction;

a first measurement chamber which faces said ceramic body and into which a gas to be measured which contains an oxygen-containing component enters;

a second measurement chamber communicating with said first measurement chamber; and

an oxygen ion pump cell comprising a solid electrolyte substrate and a pair of electrodes, which are disposed on the same side of the solid electrolyte substrate such that one of the electrodes faces said second measurement chamber and which electrodes differ in area.

13. The sensor for determining the concentration of an oxygen-containing component according to Claim 12, wherein the pair of electrodes differ in area by at least twofold.

14. A sensor for detecting an amount of gas, comprising

an oxygen-ion conductive solid electrolyte substrate having a flat side;

5 a negative electrode and a positive electrode formed on the same flat side of the substrate so as to pump oxygen from the negative electrode to the positive electrode; and

a gas diffusion⁶³ limiting means for limiting the gas diffusing into the negative electrode;

10 wherein the ratio of the area of said negative electrode to the area of said positive electrode is set within a range of 2:1 to 5:1.

15. A sensor for detecting an amount of gas, comprising

an oxygen-ion conductive solid electrolyte substrate having a flat side;

5 a negative electrode and a positive electrode formed on the same flat side of the substrate so as to pump oxygen from the negative electrode to the positive electrode; and

a gas diffusion limiting means for limiting the gas diffusing into the negative electrode;

10 wherein the ratio of the area of said negative electrode to the area of said positive electrode is set within a range of 1:2 to 1:5.